Test Wednesday

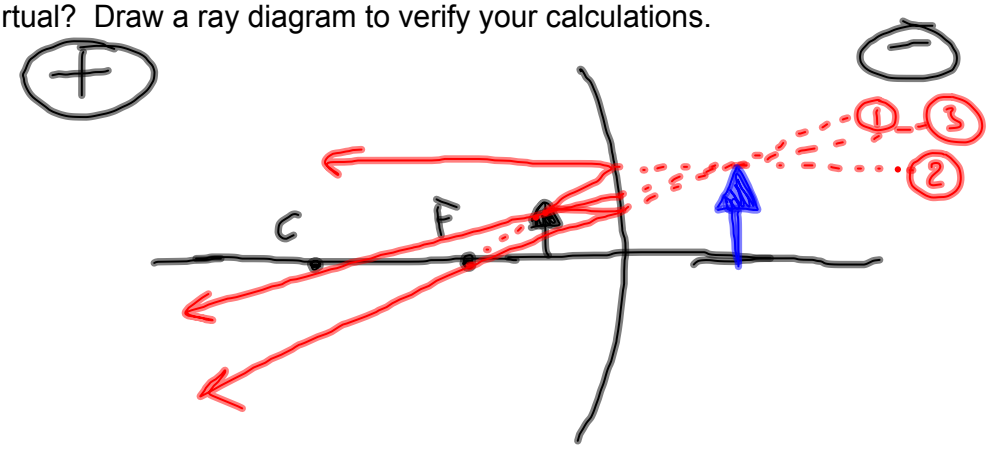
HW: p. 477 : 34

p. 479 : 49

p. 493 : 1, 2 (practice A)

Mirror Practice Problem and Transmission Notes 1st Block 12.12.11

A concave makeup mirror is designed so that a person 25.0 cm in front of it sees an upright image at a distance of 50.0 cm behind the mirror. What is the radius of curvature of the mirror? What is the magnification of the image? Is the image real or virtual? Draw a ray diagram to verify your calculations.



$d_o = 25\ cm$

$d_i = -50\ cm$

negative bec.

image is virtual

$$\frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f}$$

$f = 50\ cm$

$R = 2f$

$= 100\ cm$

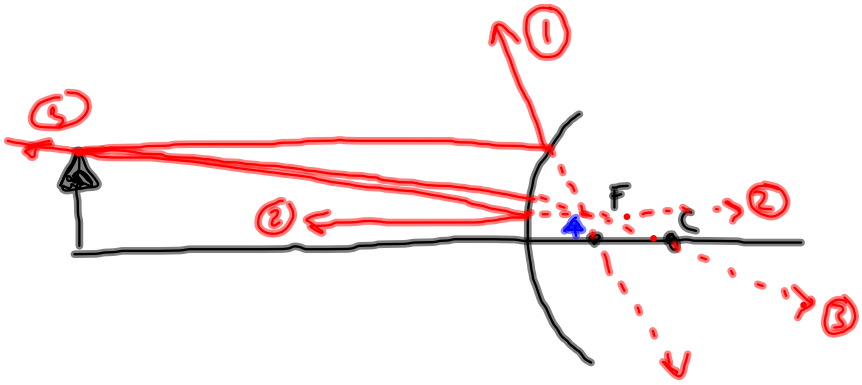
$$M = -\frac{d_i}{d_o}$$

$$= -\frac{(-50\ cm)}{(25\ cm)}$$

$$= 2$$

Image is virtual, larger, upright.

A spherical glass ornament is 6.00 cm in diameter. If an object is placed 10.5 cm away from the ornament, where will its image form? What is the magnification? Is the image virtual or real? Is the image inverted or upright? Draw a ray diagram to verify your calculations.



$$\frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f}$$

$d_o = 10.5$ cm

$f = -1.5$ cm

$d_i = ?$

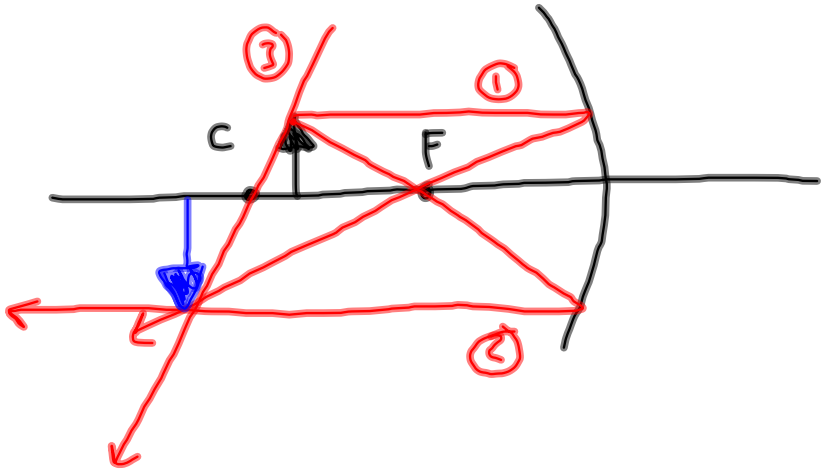
$d_i = -1.31$ cm

$$M = -\frac{d_i}{d_o}$$

$$= 0.125$$

Image is virtual, upright, smaller.

A concave mirror has a focal length of 25.0 cm and an object is placed 45.0 cm away from the mirror. Where is the image formed? Is it inverted or upright, larger, smaller, or the same size? Draw a ray diagram to verify.



$$\frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f}$$

$$d_i = 56.3 \text{ cm}$$

$$M = -\frac{d_i}{d_o}$$

$$= -1.25$$

Image is real, inverted, larger.

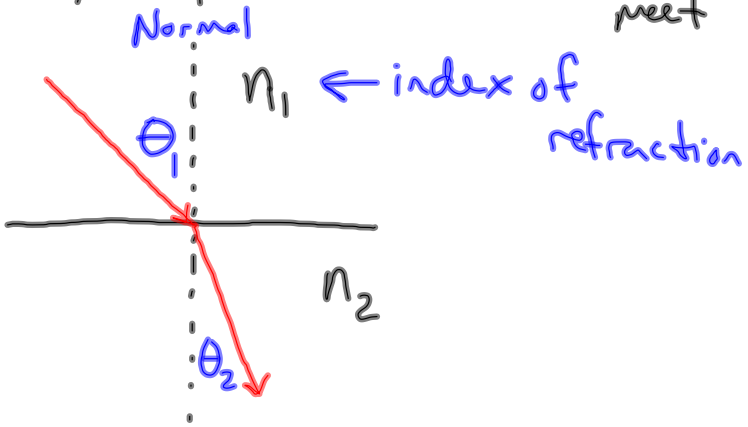
Transmission: (Refraction)

- Refraction → bending of light as it goes from one medium to another
- Refraction happens when velocity of light changes.

$$v = \lambda f$$

↑ this is what changes
↖ stays constant

- Boundary → place where two media meet



- Index of refraction:

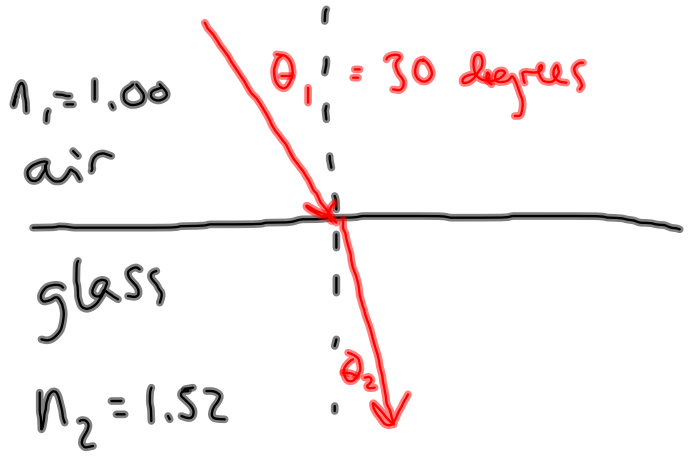
$$n = \frac{c}{v}$$

c → speed of light in vacuum
v → speed of light in medium

- Snell's Law:

$$n_1 \sin\theta_1 = n_2 \sin\theta_2$$

A light ray of wavelength 589 nm (produced by a sodium lamp) traveling through air strikes a smooth, flat slab of crown glass (n = 1.52) at an angle of 30.0 degrees to the normal. Find the angle of refraction.



$$n_1 \sin\theta_1 = n_2 \sin\theta_2$$

$$\theta_2 = \sin^{-1}\left[\frac{n_1}{n_2}\sin\theta_1\right]$$

$$= 19.2^\circ$$

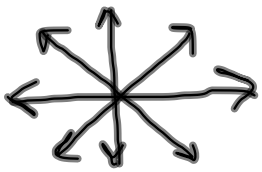
If wave goes from lower n to higher n, then angle will decrease.

If wave goes from higher n to lower n, then angle will increase.

Polarization:

- Light is typically aligned (polarized) in all directions.

- Look at light wave head-on:



- After reflecting off a surface, light can become polarized: